

# **US EPA Mid-Continent Ecology Division**

## **Research Project Summary**

### **Tissue Distribution of Persistent Bioaccumulative Toxicants in Fish Early Life Stages**

#### ***Overview***

The objective of the Fish Early Life Stage Dosimetry Project is to better understand the dynamic distribution of persistent bioaccumulative toxicants (PBTs) in tissues throughout early life stages in order to describe and model the toxic mechanisms by which these chemicals act. The small size of embryonic and larval fish limits the analytical methods currently available to measure PBTs in tissues. Multi-photon laser scanning microscopy (MPLSM) is one approach that can be used to describe the tissue distribution of PBTs. This method is ideal for imaging in live tissues and small organisms because the near infrared wavelength laser can penetrate hundreds of microns into thick specimens and its lower energy is less damaging to tissues than shorter wavelength lasers used for conventional fluorescence microscopy. Polycyclic aromatic hydrocarbons (PAHs) were selected as the model PBTs to test in this project because their fluorescent properties provide a basis for study by MPLSM. PAHs are common contaminants in many waste sites and are of importance because they may induce and/or be metabolized by xenobiotic metabolizing enzymes which can lead to carcinogenic PAH metabolites. Additionally, some PAHs can cause photo-activated toxicity in aquatic organisms. A mechanistic understanding of the disposition of these chemicals during fish early life stage development is needed for establishment of scientifically sound water quality criteria based on toxicity associated with chemical residues in tissues of the embryo and larvae which result from maternal and post maternal bioaccumulation.

#### ***Key Products***

Hornung MW, Cook PM, Flynn KM, Lothenbach DB, Johnson RD, and Nichols JW. 2003. Use of multi-photon laser-scanning microscopy to describe the distribution of xenobiotic chemicals in fish early life stages. *Aquat Toxicol.* (Accepted)

#### ***For further information on this research contact:***

Michael Hornung  
[hornung.michael@epa.gov](mailto:hornung.michael@epa.gov)  
(218) 529-5236